

Geophysical mapping of a shallow contaminant plume in thin glacial till, Terra Nova waste disposal site, northeast Newfoundland

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Geophysical techniques have been used to map the lateral extent of a groundwater contaminant plume in a region of thin glacial till overburden at a domestic waste disposal site in Newfoundland. This site is typified by waste cells that have significant quantities of material above the water table.

VLF-EM tilt angle, VLF-Resistivity and terrain conductivity data were collected at 227 stations on a grid with station and line spacing of 15.2 m. The depth to bedrock at each of the ten water monitoring wells located on the site was known from drilling and used to derive the top layer resistivity distribution over the grid. This resistivity was then used in an algorithm to determine the depth to bedrock at each grid point

and to produce a bedrock topography map. Two bedrock channels, along which contaminant can flow down slope, have been identified, one on each side of the site. The presence of contaminant in these channels is identified from the terrain conductivity data and the processed VLF tilt angle data.

Ground-probing radar (GPR) data were collected along the road traversing the site. The GPR data clearly indicate the boundaries of the waste cells, but bedrock cannot be unambiguously discerned.

The results from the geophysical surveys are highly correlated with chloride ion concentrations in water samples from the wells in the study area.